

VINALHAVEN COMMUNITY BROADBAND

GLOSSARY OF TERMS

AN EDUCATIONAL TOOL COMPILED BY FOX ISLANDS BROADBAND TASK FORCE

BROADBAND: The term broadband commonly refers to high-speed Internet access that is always on and faster than traditional dial-up access. Over the years, as what we use the internet for has demanded a larger capacity for moving data, the speed definition of broadband has increased accordingly. The current definition of broadband internet, set by the FCC (Federal Communications Commission), is a minimum bandwidth speed of 25 Mbps download and 3 Mbps upload.

BANDWIDTH: Internet speed is your allocated bandwidth. Bandwidth is a measure of how much data, measured in bits, a network can deliver per second. Bandwidth determines if you can download a picture in 2 seconds or 2 minutes.

- Bit: smallest unit of digital information
- Bps: bits per second
- Kbps: kilobits per second (1000 bits per second)
- Mbps: megabits per second (1 million bits per second)
- Gbps: gigabits per second (1 billion bits per second)

DATA: Content uploaded or downloaded via the internet, such as videos, music, emails, webpages, documents, images and so forth. Data is to bandwidth as water is to the size of a hose; as the bandwidth increases so does the amount of data that can flow through it per second. Similarly, increases in the diameter of a hose allow more water to flow in a given period of time. If the allotted bandwidth (or the water) is serving multiple devices, the flow to each can slow to a trickle. The same thing happens on a system where many users are making demands on a limited amount of bandwidth.

FACTORS AFFECTING INTERNET SPEED

- Connection type is significant to how fast your internet can be. (see below)
- Outdated or misconfigured equipment can slow down the transmission of data.
- Distance from your ISP hub. The longer the distance, the longer it will take for your data to transfer from the internet to your computer.
- Congestion usually happens during peak usage times, like when everyone gets off work and logs onto the internet, or any time when more demand is placed on the system (for example, Vinalhaven in the summer). In a home network, congestion slows the internet when everyone is online at the same time: someone streaming a movie, another doing homework, another playing video games and so forth.

INTERNET SERVICE PROVIDERS (ISPs) come in several forms including privately owned commercial businesses, electric cooperatives, and municipal providers.

ISPs employ several transmission technologies to connect to your home.

- Digital Subscriber Line (DSL) is a wireline technology, using copper phone lines to transmit data. Speed degrades quickly over distance. The longer the distance between the DSL connection point and the user, the slower the service. Speeds for DSL usually top out at 5-7 Mbps.
- Cable companies use cable TV infrastructure (coaxial cables) to provide internet access, similar to the way DSL uses the phone network infrastructure. Since a cable network can share the last mile connection among hundreds of subscribers, they are particularly prone to congestion problems.
- Fiber Optic Technology converts electrical signals carrying data to light and sends the light through transparent glass or plastic fibers about the diameter of a human hair. These fibers are capable of transmitting large amounts of data at high transfer rates as pulses of light. Fiber transmits data at speeds far exceeding DSL or cable modem speeds. Often abbreviated as FTTH (fiber to the home) or FTTP (fiber to the premise), fiber optics connect directly to a home or building.
- Satellite broadband is a form of wireless broadband, which is affected by line of sight to the orbiting satellite and the weather. Often the only option in rural areas, satellite speeds are generally comparable to DSL and cable.
- Wireless broadband connects a home or business to the Internet using a radio link between the customer's location and the service provider's facility, often a cell phone tower. Speeds are generally comparable to DSL and cable.

3G, 4G, 5G designates successive generations of wireless technology, each faster than the one before.

- 3G offered speeds of less than 1 Mbps
- 4G is 10 times faster than 3G with speeds of 5-12 Mbps.
- 4G LTE, the next generation of 4G, provides speeds up to 100 Mbps.
- 5G, which is still under development, is rumored to offer speeds of up to 1 Gbps.

BLUETOOTH: Wireless data standard for transferring data over short ranges. Bluetooth is used for many applications such as wireless mice and keyboards and connecting peripherals to smartphones. Fun fact: It is named after a 12th century king, Harold Bluetooth, famed for uniting tribes in Denmark.

WiFi: Term used for wireless internet or wireless signal.

HOT SPOT: Area where there is a wireless wi-fi signal.

SIM: Subscriber Identity Module. A memory chip that stores mobile subscriber information and allows access to mobile network services.

MODEMS and ROUTERS: A modem is a device that converts data to and from a format that's suitable for transmission between devices, like a computer to the internet. A router directs traffic on a home network.

UPLOAD AND DOWNLOAD – SYMMETRICAL AND ASYMMETRICAL

Download and upload describe the direction of the data between the end user and the provider. Download and upload speeds are expressed in Mbps: 10/10 is a symmetrical system with both down and upload at the same speed. An asymmetrical system, for example 25/3, lists the download speed first. Most internet services are asymmetric, with wider bandwidth/faster speeds to download, and slower to upload. The assumption is that most users consume data rather than share or upload it. Upload speed is important to users who need to share large files of data.

LATENCY: Reaction speed of a network; the time it takes to send data and receive a reply, measured in milliseconds (ms). Too high a “lag” can be a problem for activities that rely on rapid communications, such as online gaming. Satellite broadband connections have very high latency rates due to the time it takes to transfer data to and from orbit.

DIGITAL DIVIDE: The gap between those parts of the population who have access to the internet and other digital technologies and those sections that do not. There is concern that as so many services become available online, groups without digital access will be left behind and miss opportunities in life and in work.

DIGITAL EQUITY ensures that all individuals and communities have the information technology capacity needed for full participation in society, democracy and economy. Equity is necessary for civic and cultural participation, employment, lifelong learning, and access to essential services.

INTERNET OF THINGS: Objects with embedded electronics and sensors which share data and can be remotely controlled. A “thing” can be anything from a smart thermostat to a security camera, a smart home device like Alexa to an internet-connected refrigerator.

VoIP: Voice over Internet Protocol. A technology for making phone calls using an internet connection from any device, including mobile and land-line phones. Skype is currently the most popular VoIP application.

TELEMEDICINE: The use of high-speed, high-capacity internet to support long-distance health care services. Goals include the ability to bring quality health care to those living far from hospitals or to elderly patients wishing to age in place. Patients are able to be seen, treated, monitored, and given tools to manage their own health care.

ONLINE EDUCATION: Creating access for all eliminates the “homework gap” for those students increasingly required to complete assignments online. Adult learners benefit from remote learning opportunities to complete academic degrees and access technical and mechanical training.

TELECOMMUTING: Working from home. More and more corporations and small companies are hiring workers to work full time from home. Those who have that ability today are weathering the pandemic while maintaining their livelihoods. Online job opportunities allow one to live wherever they choose while still making a good living. Telecommuting also encourages entrepreneurship and helps small businesses compete in a wider marketplace.

SOCIAL INTERACTION: Online conferences, meetings, and social gatherings have become the norm. Internet connections support the ability of isolated people to maintain contact with often widely scattered family and friends, as well as access to information and networks of shared interests. Social support and interaction have positive influences on physical and mental well-being, especially among people living alone, decreasing loneliness and fostering a sense of belonging.

Terms for constructing a system

GRANT: A legal instrument reflecting the relationship between a government agency and a recipient. The main purpose is to dispense money and/or resources in order to accomplish a public purpose.

BACKBONE: The internet is a network of networks, and the large trunk lines that connect them are referred to as the backbone. Like a highway network, the interstate highways are the backbones that connect regions that have highway networks of their own.

BACKHAUL or MIDDLE MILE: Section of the network that connects the last mile portion of the network to the service providers core network.

LAST MILE: Final leg of the connection between the service provider and the customer.

MAKE READY: Work necessary to make a pole or right-of-way available for the attachment of additional lines, wires or cables.

TAKE RATE: The number of subscribers to a service, typically expressed as a percentage of those taking the service divided by the total number of people who could take the service. If a community fiber network passes 1000 people and 600 people subscribe, it has a take rate of 60%. When planning a network, it will be built to be profitable at or above a certain take rate.

MUNICIPAL NETWORK: A broadband network owned by a local government. Some are run by the municipality and others are managed by an ISP under contract.

PPP: A public-private partnership divides risks and responsibilities of an infrastructure project between public and private entities.

FIBER AS A FUTURE-PROOF TECHNOLOGY

- **Tried and tested over decades throughout the world.** Fiber optic is not new. Fiber cables have been used for backbone connectivity since the 1980s, with hundreds of fiber optic cables running across the sea floor all around the world. What's new is fiber cables crossing the last mile to connect directly to homes and businesses.
- **Capability.** Bandwidth use roughly doubles every two years, as the expansion and demand from the Internet of Things, HD content, and the amount of data generated and transmitted increases. Technologies like 3D holographic high definition television and gaming will someday be everyday items in households. One bundle of fiber cable not much thicker than a pencil can and currently does carry all the world's communication traffic. FTTP will be able handle the increased demands with ease.

- **Easily upgradable.** Fiber optics uses glass or plastic to carry light which is used to transmit electricity. Fiber is attached to a laser that sends data as light signals. Fiber internet currently offers gigabit speeds. While that's a very high speed by today's standards, it will probably seem very slow in as little as 15 to 20 years. As the demand becomes greater, fiber has ready capacity to share. The lasers may need to be upgraded to send more information along the same strand of fiber, and one may have to upgrade home hardware, but the fiber-optic cable will require no structural upgrade to offer the capacity future generations will need.
- **Affordable.** The cost of fiber internet service is comparable to those offered by ISPs. However, the fiber is significantly more reliable, is not affected by distance from a hub or traffic congestion on the lines. Moreover, fiber offers one delivery system for telephone (cell and landline), video, audio, television, and almost any type of data transmission, using a single seamless FTTP connection. That trend will continue as consumers are given an increasing array of a la carte choices for how they receive their various communication and data streaming choices. Subscribers receiving an array of services through a fiber connection will save money.

Comparisons

DSL: not only is the driving technology outdated, the old copper lines are susceptible to corrosion. DSL is also severely limited by distance; it can push a signal to a 3-mile maximum.

Coaxial cable offers a shared system, meaning that the signal strength is dependent on how much bandwidth is being drawn on by other users connected to that same line. Moreover, cable systems are designed primarily to push data down to the customer, a significantly different model than the emerging needs of telecommuting and interactive video which require high bandwidth for both downloading and uploading.

Wireless service is not as reliable as fiber optics and can be susceptible to weather conditions and the movement of outdoor equipment due to wind. Wireless also requires a direct line of sight, one without obstructions, to the source. While 5G is rumored to have the capacity to be as fast as fiber, reliability concerns and reliance on line of sight are inherent limitation.

5G and low-orbit satellite are years away from being widely available and will not meet the same reliability and capacity standards that fiber currently has.

Fiber is an excellent investment because the technology has been thoroughly vetted in real-world situations for decades, the infrastructure is sturdy and lasts many years without repair or upgrade, and bandwidth is easy and inexpensive to upgrade to almost unlimited capacity.

The mission of the Fox Islands Broadband Taskforce (FIBTF) is to support the Town of Vinalhaven in its efforts to pursue a broadband solution for Vinalhaven that provides affordable, accessible, future-proofed internet speeds to everyone in our community. To learn more and get involved in the Taskforce's efforts, please contact FIBTF Chair, Janann Sherman at janannsherman@gmail.com or FIBTF Staff Support, Gabe McPhail at gmcphail@townofvinalhaven.org

Thank you Janann Sherman for authoring this Glossary—a valuable tool for communities learning to navigate broadband. Published 2021 by the Fox Islands Broadband Task Force.